

# Air and Space Integration

## *Impact and Risk to Aviation from Space Hazards*

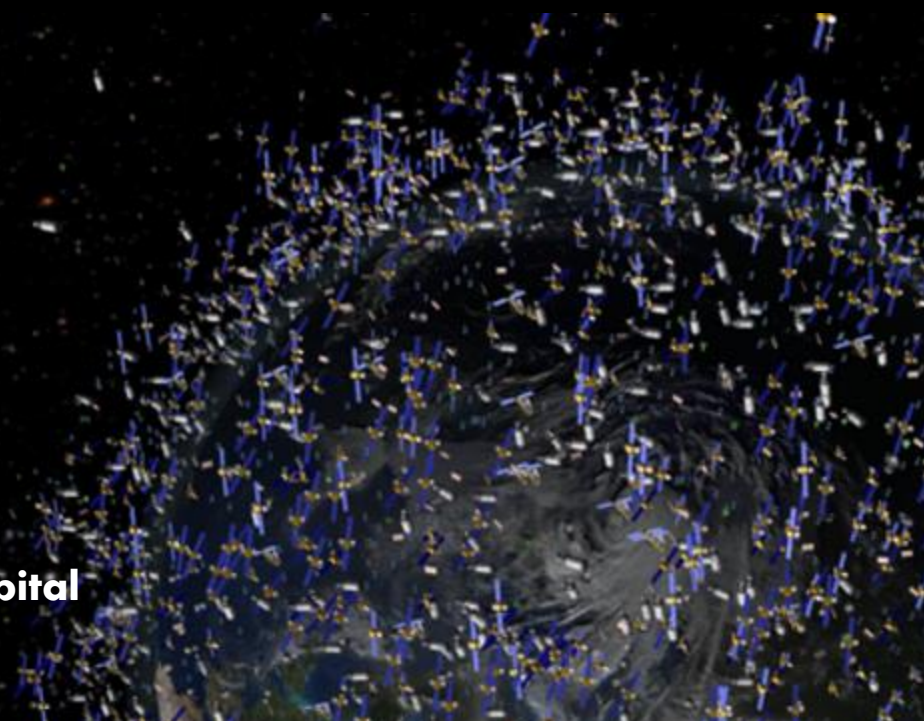


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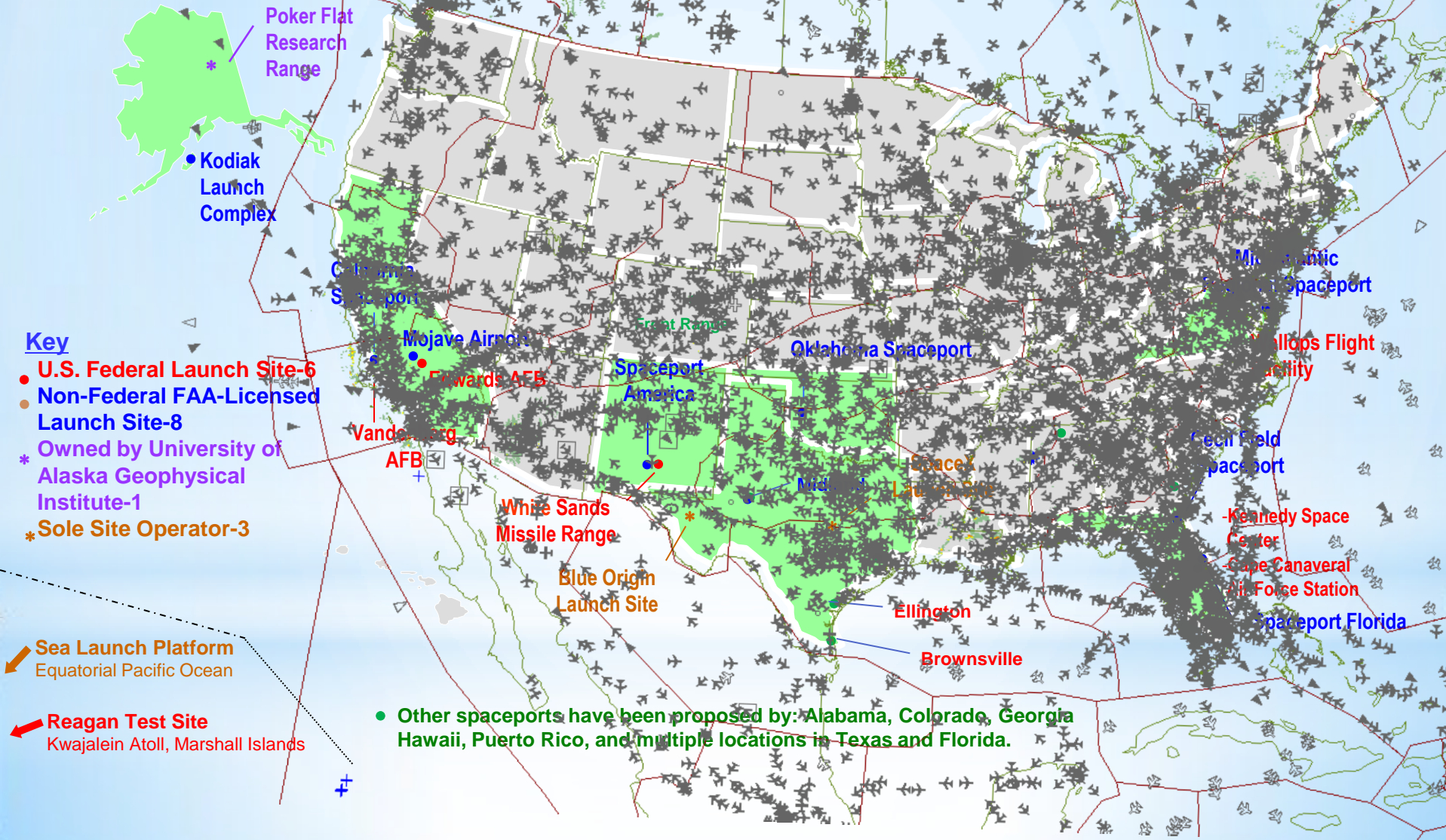
**Presented to: 2<sup>nd</sup> ICAO/UNOOSA Symposium**

**Panel 3 Risks Posed to Civil Aviation and Suborbital  
Operations**



# U.S. Spaceports

## Commercial/Government/Private Launch Sites



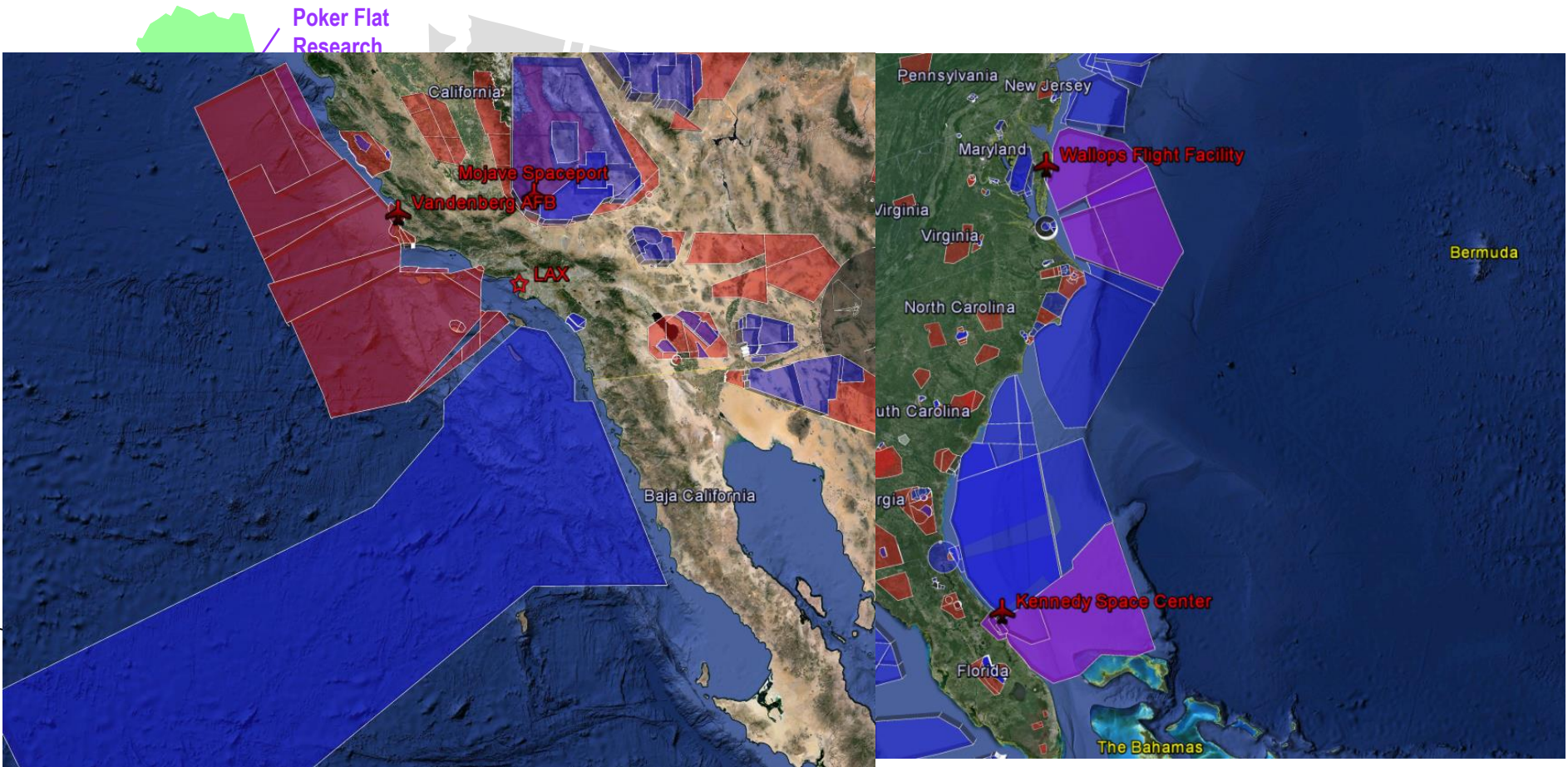
# Air and Space Traffic

## Current Approach: Accommodation

- Generally, the FAA protects aircraft against potential hazards posed by launch and reentry vehicles using preemptive airspace closures (i.e., segregated airspace)
  - Relatively large, static volumes of airspace (i.e., aircraft hazard areas) are closed in advance of a launch, reentry, or amateur rocket operation to protect air traffic from hazards of vehicle failures, including falling debris
- Tactical and responsive approaches to airspace management are applied on a limited basis



# Launch Protected Areas



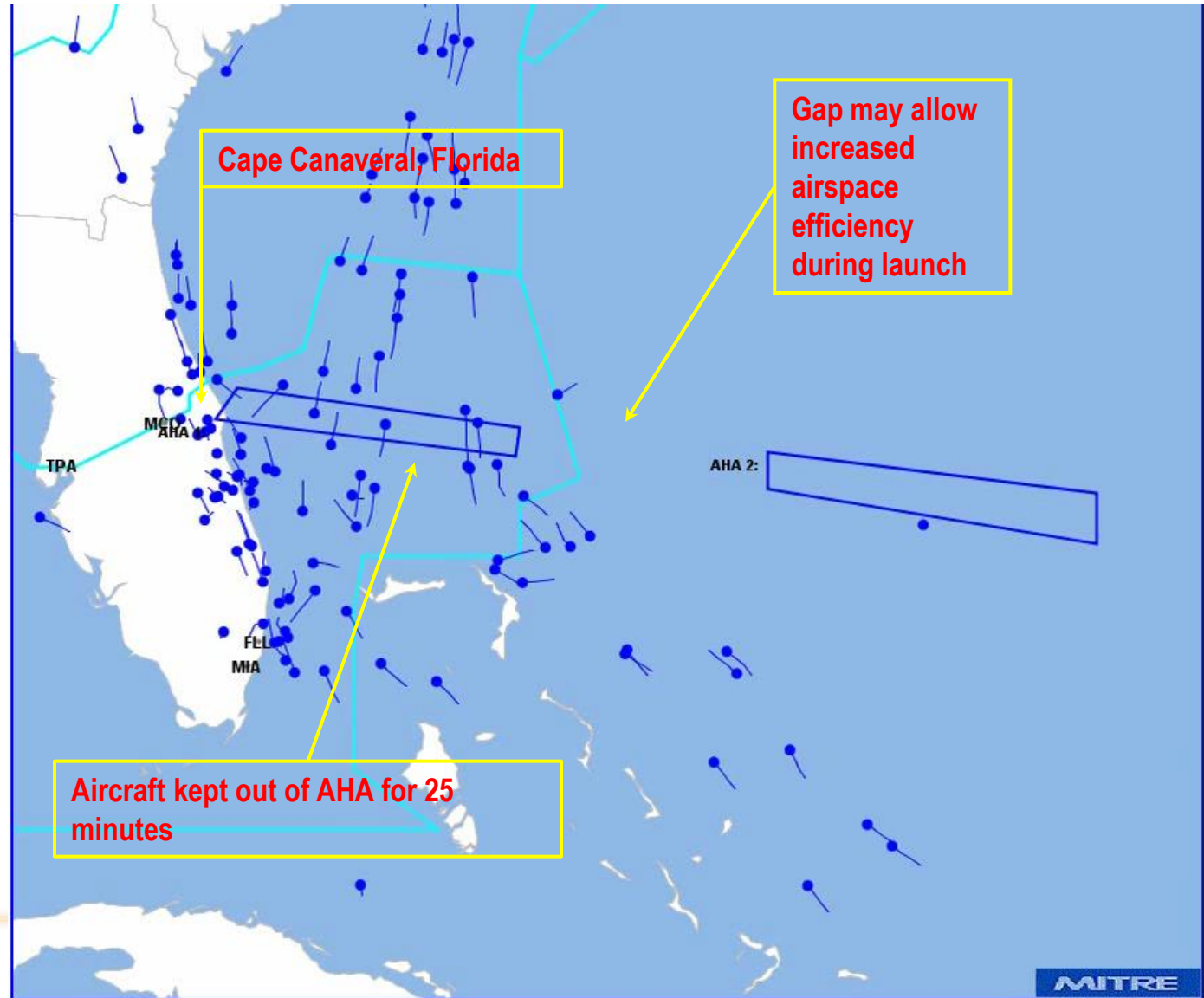
# Future Approach: Integration

- Generally, launch and reentry vehicles and aircraft will share airspace
  - Air traffic management will focus on preventing collisions between vehicles and aircraft (i.e. separation) rather than collisions between aircraft and falling debris (i.e. segregation)
- Exceptions will be made for activities that have a relatively high likelihood of failing in a manner that produces falling debris or otherwise posing elevated risk to other National Airspace System (NAS) users
  - Examples include research and development, flight test, and planned hardware jettisons



# CAPE CANAVERAL LAUNCH

**Airspace  
Management  
Planning  
during  
periods of  
heavy traffic**



# Impact to Aviation

- Unplanned Debris
  - May reenter over busy air traffic routes.
    - Notification received and an Advisory issued if needed.
    - Notification may be too short for any action.



# Impact to Aviation

- Space Weather
  - May create a hazardous environment due to loss of communications, power and GPS capabilities.
- Nextgen solutions will provide 4D trajectories (Longitude, Latitude, Altitude and Time) that may eventually be useful to space vehicles.





# Questions?

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